

REMARKS

This is a full and timely response to the Office Action mailed February 18, 2009, submitted concurrently with a one month extension of time to extend the due date for response to June 18, 2009.

By this Amendment, claim 1 has been amended, and new claims 57 and 58 have been added to more particularly define the present invention. Thus, claims 1-53 and 55-58 are currently pending in this application. Support for the claim amendments and new claims can be readily found variously throughout the specification and the original claims, see, in particular, page 4, lines 14-15, and page 11, lines 28, to page 12, line 9, of the specification.

In view of these amendments, Applicant believes that all pending claims are in condition for allowance. Reexamination and reconsideration in light of the above amendments and the following remarks is respectfully requested.

Rejection under 35 U.S.C. §112

Claims 6 and 21 are rejected under 35 U.S.C. §112, first paragraph, as allegedly failing to comply with the enablement requirement. Applicant respectfully traverses this rejection.

The Examiner has maintained the rejection of claims 6 and 21 since the Examiner still believes that the protective material formed on the wheel and brittle material, and cutting of the protective material after scribing are mutually exclusive since in order for the protective material to be on the wheel it must have performed a scribing step. Based on Applicant's review of the rejected claims, specification and the Examiner comments (see, in particular, the first paragraph on page 7 of the Office Action), Applicant believes that the Examiner has based his arguments on an incorrect understanding of the present invention.

It is important for the Examiner to understand that the protective material on the scribed surface is not completely cut since "cutting" by the cutter wheel of the present invention is different from cutting by a saw blade or the like described in the cited references. In contrast to a saw blade, the cutter wheel of the present invention rolls on the surface of a cutting object such that the surface pattern of the "blade edge ridge" (i.e. where the cutter wheel presses on the cutting object) is transcribed onto the surface of the cutting object.

In particular, since the present invention utilizes a cutter wheel with grooves formed on the blade-edge ridge, the pressing pattern of a broken line ("- - - -" as seen from the vertical perspective) is formed on the protective material (e.g. resin film). Hence, in the rolled over parts of the protective material corresponding to the grooves of the blade-edge ridge, the protective material is not pressed at all or is pressed to the extent that the blade-edge ridge does not penetrate the protective material. Therefore, given such action by the grooves in the cutter wheel, the protective material after the scribing process is not completely cut. It is only cut at the "line" portions of the broken line but not at its "space" portions.

Further, even though the protective material is not completely cut, by pressing the brittle material substrate under the protective material according to the broken line, cracks that were generated in the pressed parts of the substrate advance towards each other to connect with each other to make consecutive cracks (i.e. a scribe line) along the movement trace of the cutter wheel. This, in turn, results in the scribing of the brittle material substrate even though the protective material is not completely cut by the grooved cutter wheel.

Thus, in view of the above explanation, Applicant believes that the protective material on the wheel and brittle material, and cutting the protective material after scribing are not mutually exclusive since it is possible in the present invention to perform a scribing step with the cutter wheel on the protective material and afterwards, cut the protective material after scribing (see Figures 1(a) to 1(d) and Figures 5(a) to 5(h) of the present drawings and related explanations in the specification).

Thus, for these reasons, withdrawal of this rejection is respectfully requested.

Rejections under 35 U.S.C. §103

Claims 1-4, 19, 20, 22, 23, 25-34, 36, 46-50, 52, 53, 55, and 56 are rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over Jin et al. (U.S. Patent No. 6,121,118) in view of Siniaguine et al. (U.S. Patent Application Publication No. 2001/0001215), Yamamichi (JP 356067933), and Hasegawa et al. (U.S. Patent No. 6,461,940). Further, claims 12-15 and 39-41 are rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over Jin et al. (U.S. Patent No. 6,121,118), Siniaguine et al. (U.S. Patent Application Publication No. 2001/0001215), Yamamichi

(JP 356067933), and Hasegawa et al. (U.S. Patent No. 6,461,940), and further in view of Ball (U.S. Patent Application Publication No. 2002/0031864). Applicant respectfully traverses these rejections.

To establish a *prima facie* case of obviousness, the cited references, in combination, must teach or suggest the invention as a whole, including all the limitations of the claims. Here, in this case, Jin et al., in combination with Siniaguine et al., Yamamichi, Hasegawa et al., and Ball, fails to teach or suggest all the claim limitations with particular emphasis on the limitations "wherein the method comprises a first scribing step of pressing and rolling the cutter wheel on a protective material by moving the tip holder in a horizontal direction, in a state in which the protective material is provided on at least one substrate surface of the brittle material substrate, thereby inscribing a scribe line on the brittle material substrate, while simultaneously forming a vertical crack extending from the scribe line in a thickness direction of the brittle material substrate" (claim 1), "wherein rolling the cutter wheel on the protective material comprises moving the cutter wheel along a surface of the protective material by rotation without sliding" (claim 1), "wherein the apparatus comprises a first scribing device that presses and rolls the cutter wheel on a protective material by moving the tip holder in a horizontal direction, in a state in which the protective material is provided on at least one substrate surface of the brittle material substrate, thereby inscribing a scribe line on the brittle material substrate, while simultaneously forming a vertical crack extending from the scribe line in a thickness direction of the brittle material substrate" (claim 28), "wherein rolling the cutter wheel on the protective material comprises rolling manually the cutter wheel along the surface of the protective material" (new claim 57), and "wherein the first scribing device presses and rolls manually the cutter wheel on the protective material" (new claim 58).

As noted in Applicant's response of November 17, 2008, the cited references of Jin et al., Siniaguine et al., Yamamichi, Ball, and in particular, Hasegawa et al., in the Office Action disclose a saw blade or a dicing blade being rotary driven (mechanism to rotate the saw blade or dicing blade at high speed) for cutting or grinding a substrate, thereby forming the scribe line (groove) having a width (see, for example, column 3, lines 38-39, of Hasegawa et al.). Due to the rotating mechanism of the rotary drive, the "rotating" saw blade or the dicing blade of the cited references is

capable of simultaneously cutting or grinding both the protective coating and the substrate for forming the scribe line when the protective coating is formed on a substrate surface. For example, Yamamichi discloses cutting by blade 4, a semiconductor wafer on which a photoresist coating and an aluminum coating are formed on the surface for forming the scribe groove.

In contrast to the cited references, the cutter wheel of the present invention is not rotary driven, but instead, is rotatably supported, which means that the cutter wheel is rolled manually on the substrate surface by friction force while the cutter wheel is pressed and moved on the substrate. As the cutter wheel is rolled and pressed on the substrate surface, and as a trace that it is pressed on the substrate surface, the scribe line (marking line) is formed while simultaneously forming a vertical crack extending from the scribe line in a thickness direction of the substrate.

It is important to emphasize the cutting and grinding by a rotary driven saw blade or a dicing blade is clearly distinguishable from the rolling and pressing by the cutter wheel of the present invention. In the Merriam-Webster Online Dictionary, the term "rolling" is defined as "to move along a surface by rotation without sliding" which is clearly not equivalent in meaning to the terms "cutting" and "grinding" of the cited references.

In response to Applicant's arguments, the Examiner argues that "*Because the prior art's blade has the same shape as claimed it is capable of being used for the same function*" (see page 8 of the Office Action). Applicant disagrees with the Examiner's position. In contrast to the cutter wheel of the present invention, which is rolled manually on the substrate surface by friction force, the blades of the prior art are rotary driven. Thus, in order to achieve the advantages associated with the cutter blade of the present invention, the prior art blades would have to be completely reconfigured such that they were not rotary driven, but rather rotatably supported. As such, the advantages associated with the cutter blade of the present invention are not unappreciated properties of a prior art device as the Examiner asserts. Further, to modify the prior art blades in such a manner would destroy the principles of operation of the prior art blades since such blades is used for cutting and grinding, and not pressing and rolling. As the Examiner knows, if the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims prima facie obvious. In re Ratti, 270 F.2d 810, 123 USPQ 349 (CCPA 1959).

The Examiner further argues, "*A rotably [sic] driven wheel spins/turns over and over and therefore meets the plain and ordinary meaning of the rolling... While applicant is correct that one definition of rolling is to move on a surface, the claim is not so limited*" (see pages 7-8 of the Office Action). Thus, in view of the Examiner's statements that the cited references do not teach rolling manually (i.e. rolling without being rotary driven), Applicant has amended claim 1 to clarify this distinction. More specifically, Applicant has amended claim 1 and added new claims 57 and 58 to further recite, "*wherein rolling the cutter wheel on the protective material comprises moving the cutter wheel along a surface of the protective material by rotation without sliding*", "*wherein rolling the cutter wheel on the protective material comprises rolling manually the cutter wheel along the surface of the protective material*", and "*wherein the first scribing device presses and rolls manually the cutter wheel on the protective material*". As explained above, the rotary driven saw blade or dicing blade of Jin et al., Siniaguine et al., Yamamichi, Ball, and Hasegawa et al. inherently is not manual and must slide on the substrate in order to cut or grind the substrate to form the scribe line (groove).

Thus, in view of the comments above and the foregoing changes to the claims, Applicant respectfully submits that these rejections can no longer be sustained and should be withdrawn.

CONCLUSION

For the foregoing reasons, all the claims now pending in the present application are believed to be clearly patentable over the outstanding rejections. Accordingly, favorable reconsideration of the claims in light of the above remarks is courteously solicited. If the Examiner has any comments or suggestions that could place this application in even better form, the Examiner is requested to telephone the undersigned attorney at the below-listed number.

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Respectfully submitted,

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